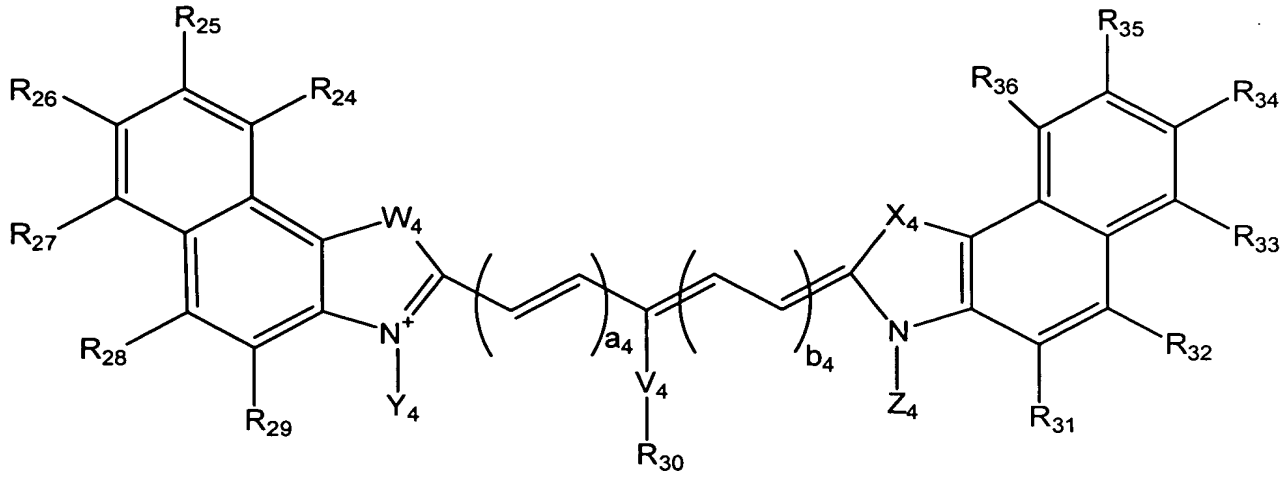
1. A pharmaceutical composition comprising an effective amount of the compound of formula 4

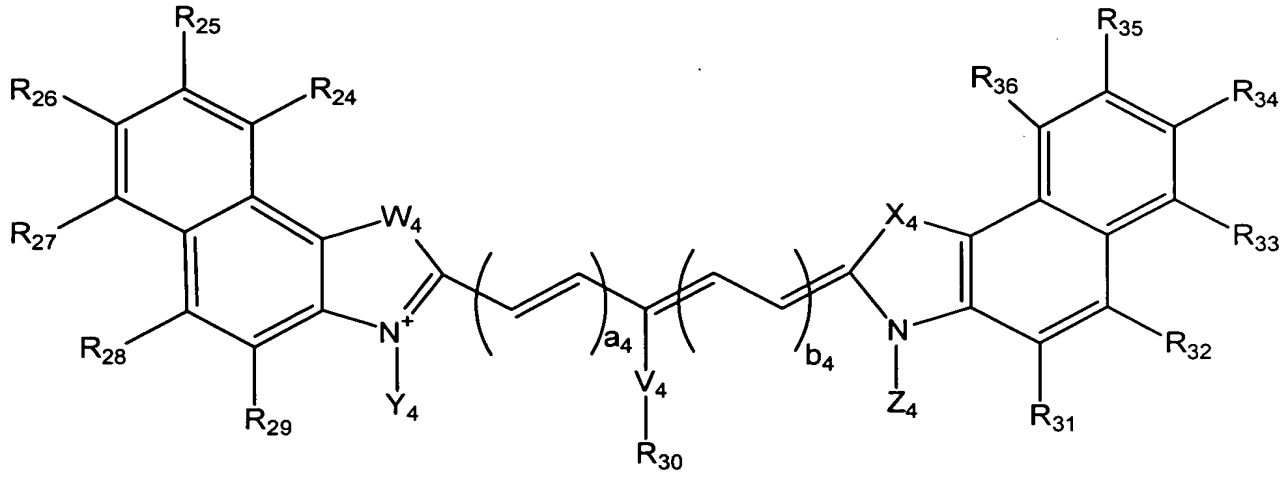


Formula 4

for a diagnostic or therapeutic procedure and a pharmaceutically acceptable carrier for administration to a mammal wherein at least one of W_4 and X_4 is $-CR_cR_d$ and the other is selected from the group consisting of $-CR_cR_d$, $-NR_c$, -O-, and -S-; R_{24}, R_{25}, R_{26}, R_{27}, R_{28}, R_{29}, R_{30}, R_{31}, R_{32}, R_{33}, R_{34}, R_{35} and R_{36}, Y_4, and Z_4 are independently selected from the group consisting of C1-C10 alkoxyl, C1-C10 polyalkoxyalkyl, C1-C20 polyhydroxyalkyl, C5-C20 polyhydroxyaryl, glucose derivatives of R groups, saccharides, amino, C1-C10 aminoalkyl, cyano, nitro, halogen, hydrophilic peptides, arylpolysulfonates, C1-C10 alkyl, C5-C20 aryl, $-SO_3T$, $-CO_2T$, -OH, $-(CH_2)_aSO_3T$, $-(CH_2)_aOSO_3T$, $-(CH_2)_aNHSO_3T$, $-(CH_2)_aCO_2(CH_2)_bSO_3T$, $-(CH_2)_aOCO(CH_2)_bSO_3T$, $-(CH_2)_aCONH(CH_2)_bSO_3T$, $-(CH_2)_aNHCO(CH_2)_bSO_3T$, $-(CH_2)_aNHCONH(CH_2)_bSO_3T$, $-(CH_2)_aNHCSNH(CH_2)_bSO_3T$, $-(CH_2)_aOCONH(CH_2)_bSO_3T$, $-(CH_2)_aPO_3HT$, $-(CH_2)_aPO_3T_2$, $-(CH_2)_aOPO_3HT$, $-(CH_2)_aOPO_3T_2$, $-(CH_2)_aNHPO_3HT$, $-(CH_2)_aNHPO_3T_2$, $-(CH_2)_aCO_2(CH_2)_bPO_3HT$, $-(CH_2)_aCO_2(CH_2)_bPO_3T_2$, $-(CH_2)_aOCO(CH_2)_bPO_3HT$, $-(CH_2)_aOCO(CH_2)_bPO_3T_2$,

$-(CH_2)_aCONH(CH_2)_bPO_3HT$, $-(CH_2)_aCONH(CH_2)_bPO_3T_2$, $-(CH_2)_aNHCO(CH_2)_bPO_3HT$, $-(CH_2)_aNHCO(CH_2)_bPO_3T_2$, $-(CH_2)_aNHCONH(CH_2)_bPO_3HT$, $-(CH_2)_aNHCONH(CH_2)_bPO_3T_2$, $-(CH_2)_aNHCSNH(CH_2)_bPO_3HT$, $-(CH_2)_aNHCSNH(CH_2)_bPO_3T_2$, $-(CH_2)_aOCONH(CH_2)_bPO_3HT$, and $-(CH_2)_aOCONH(CH_2)_bPO_3T_2$, $-CH_2(CH_2-O-CH_2)_c-CH_2-OH$, $-(CH_2)_d-CO_2T$, $-CH_2-(CH_2-O-CH_2)_e-CH_2-CO_2T$, $-(CH_2)_f-NH_2$, $-CH_2-(CH_2-O-CH_2)_g-CH_2-NH_2$, $-(CH_2)_h-N(R_a)-(CH_2)_i-CO_2T$, and $-(CH_2)_j-N(R_b)-CH_2-(CH_2-O-CH_2)_k-CH_2-CO_2T$; V_4 is a single bond or is selected from the group consisting of -O-, -S-, -Se-, and $-NR_a$; a_4 and b_4 vary from 0 to 5; a, b, d, f, h, i, and j independently vary from 1-10; c, e, g, and k independently vary from 1-100; R_a, R_b, R_c, and R_d are defined in the same manner as Y_4; and T is either H or a negative charge.

2. A pharmaceutical composition comprising an effective amount of the compound of formula 4

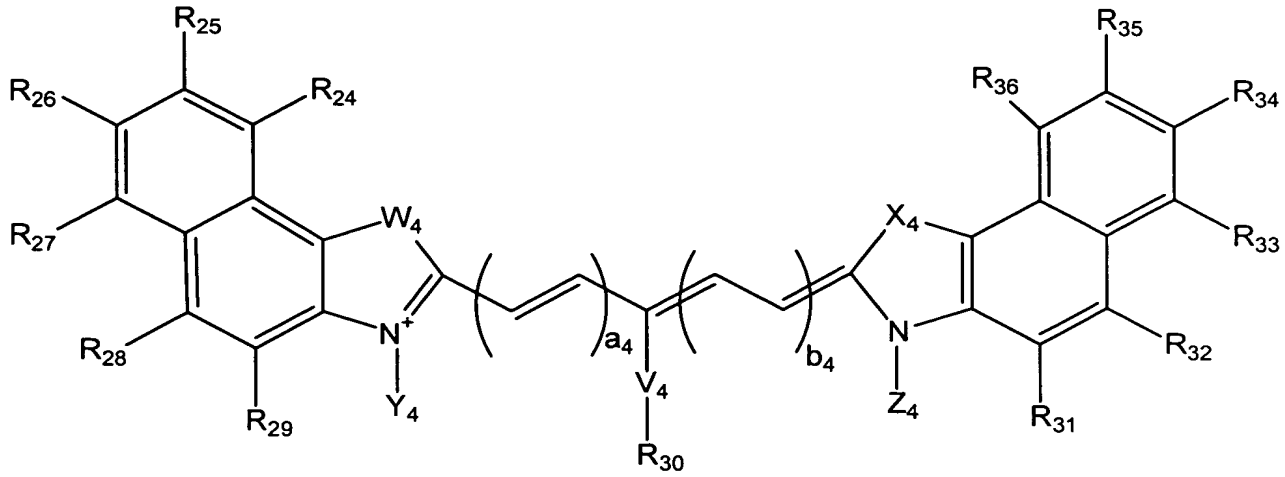


Formula 4

for a diagnostic or therapeutic procedure and a pharmaceutically acceptable carrier for administration to a mammal wherein at least one of W_4 and X_4 is O and the other is selected from the group consisting of $-CR_cR_d$, $-NR_c$, -O-, and -S-; R_{24}, R_{25}, R_{26}, R_{27}, R_{28}, R_{29}, R_{30}, R_{31}, R_{32}, R_{33}, R_{34}, R_{35} and R_{36}, Y_4, and Z_4 are independently selected from the group consisting of C1-C10 alkoxyl, C1-C10 polyalkoxyalkyl, C1-C20 polyhydroxyalkyl, C5-C20 polyhydroxyaryl, glucose derivatives of R groups, saccharides, amino, C1-C10 aminoalkyl, cyano, nitro, halogen, hydrophilic peptides, arylpolysulfonates, C1-C10 alkyl, C5-C20 aryl, $-SO_3T$, $-CO_2T$, -OH, $-(CH_2)_aSO_3T$, $-(CH_2)_aOSO_3T$, $-(CH_2)_aNHSO_3T$, $-(CH_2)_aCO_2(CH_2)_bSO_3T$, $-(CH_2)_aOCO(CH_2)_bSO_3T$, $-(CH_2)_aCONH(CH_2)_bSO_3T$, $-(CH_2)_aNHCO(CH_2)_bSO_3T$, $-(CH_2)_aNHCONH(CH_2)_bSO_3T$, $-(CH_2)_aNHCSNH(CH_2)_bSO_3T$, $-(CH_2)_aOCONH(CH_2)_bSO_3T$, $-(CH_2)_aPO_3HT$, $-(CH_2)_aPO_3T_2$, $-(CH_2)_aOPO_3HT$, $-(CH_2)_aOPO_3T_2$, $-(CH_2)_aNHPO_3HT$, $-(CH_2)_aNHPO_3T_2$, $-(CH_2)_aCO_2(CH_2)_bPO_3HT$, $-(CH_2)_aCO_2(CH_2)_bPO_3T_2$, $-(CH_2)_aOCO(CH_2)_bPO_3HT$, $-(CH_2)_aOCO(CH_2)_bPO_3T_2$,

$-(CH_2)_aCONH(CH_2)_bPO_3HT$, $-(CH_2)_aCONH(CH_2)_bPO_3T_2$, $-(CH_2)_aNHCO(CH_2)_bPO_3HT$, $-(CH_2)_aNHCO(CH_2)_bPO_3T_2$, $-(CH_2)_aNHCONH(CH_2)_bPO_3HT$, $-(CH_2)_aNHCONH(CH_2)_bPO_3T_2$, $-CH_2)_aNHCSNH(CH_2)_bPO_3HT$, $-(CH_2)_aNHCSNH(CH_2)_bPO_3T_2$, $-(CH_2)_aOCONH(CH_2)_bPO_3HT$, and $-CH_2)_aOCONH(CH_2)_bPO_3T_2$, $-CH_2(CH_2-O-CH_2)_c-CH_2-OH$, $-(CH_2)_d-CO_2T$, $-CH_2-(CH_2-O-CH_2)_e-CH_2-CO_2T$, $-(CH_2)_f-NH_2$, $-CH_2-(CH_2-O-CH_2)_g-CH_2-NH_2$, $-(CH_2)_h-N(R_a)-(CH_2)_l-CO_2T$, and $-(CH_2)_j-N(R_b)-CH_2-(CH_2-O-CH_2)_k-CH_2-CO_2T$; V_4 is a single bond or is selected from the group consisting of -O-, -S-, -Se-, and $-NR_a$; a_4 and b_4 vary from 0 to 5; a, b, d, f, h, i, and j independently vary from 1-10; c, e, g, and k independently vary from 1-100; R_a, R_b, R_c, and R_d are defined in the same manner as Y_4; and T is either H or a negative charge.

3. A pharmaceutical composition comprising an effective amount of the compound of formula 4

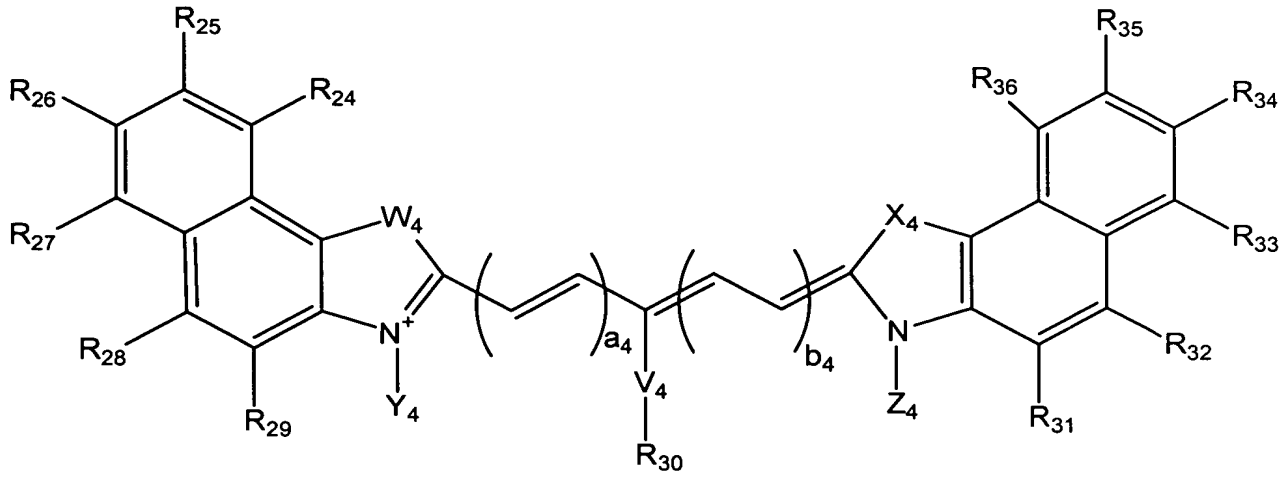


Formula 4

for a diagnostic or therapeutic procedure and a pharmaceutically acceptable carrier for administration to a mammal wherein at least one of W_4 and X_4 is NR_c and the other is selected from the group consisting of $-CR_cR_d$, $-NR_c$, -O-, and -S-; R_{24}, R_{25}, R_{26}, R_{27}, R_{28}, R_{29}, R_{30}, R_{31}, R_{32}, R_{33}, R_{34}, R_{35} and R_{36}, Y_4, and Z_4 are independently selected from the group consisting of C1-C10 alkoxyl, C1-C10 polyalkoxyalkyl, C1-C20 polyhydroxyalkyl, C5-C20 polyhydroxyaryl, glucose derivatives of R groups, saccharides, amino, C1-C10 aminoalkyl, cyano, nitro, halogen, hydrophilic peptides, arylpolysulfonates, C1-C10 alkyl, C5-C20 aryl, $-SO_3T$, $-CO_2T$, -OH, $-(CH_2)_aSO_3T$, $-(CH_2)_aOSO_3T$, $-(CH_2)_aNHSO_3T$, $-(CH_2)_aCO_2(CH_2)_bSO_3T$, $-(CH_2)_aOCO(CH_2)_bSO_3T$, $-(CH_2)_aCONH(CH_2)_bSO_3T$, $-(CH_2)_aNHCO(CH_2)_bSO_3T$, $-(CH_2)_aNHCONH(CH_2)_bSO_3T$, $-(CH_2)_aNHCSNH(CH_2)_bSO_3T$, $-(CH_2)_aOCONH(CH_2)_bSO_3T$, $-(CH_2)_aPO_3HT$, $-(CH_2)_aPO_3T_2$, $-(CH_2)_aOPO_3HT$, $-(CH_2)_aOPO_3T_2$, $-(CH_2)_aNHPO_3HT$, $-(CH_2)_aNHPO_3T_2$, $-(CH_2)_aCO_2(CH_2)_bPO_3HT$, $-(CH_2)_aCO_2(CH_2)_bPO_3T_2$, $-(CH_2)_aOCO(CH_2)_bPO_3HT$, $-(CH_2)_aOCO(CH_2)_bPO_3T_2$,

$-(CH_2)_aCONH(CH_2)_bPO_3HT$, $-(CH_2)_aCONH(CH_2)_bPO_3T_2$, $-(CH_2)_aNHCO(CH_2)_bPO_3HT$, $-(CH_2)_aNHCO(CH_2)_bPO_3T_2$, $-(CH_2)_aNHCONH(CH_2)_bPO_3HT$, $-(CH_2)_aNHCONH(CH_2)_bPO_3T_2$, $-(CH_2)_aNHCSNH(CH_2)_bPO_3HT$, $-(CH_2)_aNHCSNH(CH_2)_bPO_3T_2$, $-(CH_2)_aOCONH(CH_2)_bPO_3HT$, and $-(CH_2)_aOCONH(CH_2)_bPO_3T_2$, $-CH_2(CH_2\text{-}O\text{-}CH_2)_c\text{-}CH_2\text{-}OH$, $-(CH_2)_d\text{-}CO_2T$, $-CH_2\text{-}(CH_2\text{-}O\text{-}CH_2)_e\text{-}CH_2\text{-}CO_2T$, $-(CH_2)_f\text{-}NH_2$, $-CH_2\text{-}(CH_2\text{-}O\text{-}CH_2)_g\text{-}CH_2\text{-}NH_2$, $-(CH_2)_h\text{-}N(R_a)\text{-}(CH_2)_i\text{-}CO_2T$, and $-(CH_2)_j\text{-}N(R_b)\text{-}CH_2\text{-}(CH_2\text{-}O\text{-}CH_2)_k\text{-}CH_2\text{-}CO_2T$; V_4 is a single bond or is selected from the group consisting of -O-, -S-, -Se-, and $-NR_a$; a_4 and b_4 vary from 0 to 5; a, b, d, f, h, i, and j independently vary from 1-10; c, e, g, and k independently vary from 1-100; R_a, R_b, R_c, and R_d are defined in the same manner as Y_4; and T is either H or a negative charge.

4. A pharmaceutical composition comprising an effective amount of the compound of formula 4



Formula 4

for a diagnostic or therapeutic procedure and a pharmaceutically acceptable carrier for administration to a mammal wherein at least one of W_4 and X_4 is S and the other is selected from the group consisting of $-CR_cR_d$, $-NR_c$, -O-, and -S-; R_{24}, R_{25}, R_{26}, R_{27}, R_{28}, R_{29}, R_{30}, R_{31}, R_{32}, R_{33}, R_{34}, R_{35} and R_{36}, Y_4, and Z_4 are independently selected from the group consisting of C1-C10 alkoxyl, C1-C10 polyalkoxyalkyl, C1-C20 polyhydroxyalkyl, C5-C20 polyhydroxyaryl, glucose derivatives of R groups, saccharides, amino, C1-C10 aminoalkyl, cyano, nitro, halogen, hydrophilic peptides, arylpolysulfonates, C1-C10 alkyl, C5-C20 aryl, $-SO_3T$, $-CO_2T$, -OH, $-(CH_2)_aSO_3T$, $-(CH_2)_aOSO_3T$, $-(CH_2)_aNHSO_3T$, $-(CH_2)_aCO_2(CH_2)_bSO_3T$, $-(CH_2)_aOCO(CH_2)_bSO_3T$, $-(CH_2)_aCONH(CH_2)_bSO_3T$, $-(CH_2)_aNHCO(CH_2)_bSO_3T$, $-(CH_2)_aNHCONH(CH_2)_bSO_3T$, $-(CH_2)_aNHCSNH(CH_2)_bSO_3T$, $-(CH_2)_aOCONH(CH_2)_bSO_3T$, $-(CH_2)_aPO_3HT$, $-(CH_2)_aPO_3T_2$, $-(CH_2)_aOPO_3HT$, $-(CH_2)_aOPO_3T_2$, $-(CH_2)_aNHPO_3HT$, $-(CH_2)_aNHPO_3T_2$, $-(CH_2)_aCO_2(CH_2)_bPO_3HT$, $-(CH_2)_aCO_2(CH_2)_bPO_3T_2$, $-(CH_2)_aOCO(CH_2)_bPO_3HT$, $-(CH_2)_aOCO(CH_2)_bPO_3T_2$,

$-(CH_2)_aCONH(CH_2)_bPO_3HT$, $-(CH_2)_aCONH(CH_2)_bPO_3T_2$, $-(CH_2)_aNHCO(CH_2)_bPO_3HT$, $-(CH_2)_aNHCO(CH_2)_bPO_3T_2$, $-(CH_2)_aNHCONH(CH_2)_bPO_3HT$, $-CH_2)_aNHCONH(CH_2)_bPO_3T_2$, $-(CH_2)_aNHCSNH(CH_2)_bPO_3HT$, $-(CH_2)_aNHCSNH(CH_2)_bPO_3T_2$, $-(CH_2)_aOCONH(CH_2)_bPO_3HT$, and $-(CH_2)_aOCONH(CH_2)_bPO_3T_2$, $-CH_2(CH_2$-O $-CH_2)_c-CH_2-OH$, $-(CH_2)_d-CO_2T$, $-CH_2-(CH_2-O-CH_2)_e-CH_2-CO_2T$, $-(CH_2)_f-NH_2$, $-CH_2-(CH_2-O-CH_2)_g-CH_2-NH_2$, $-(CH_2)_h-N(R_a)-(CH_2)_l-CO_2T$, and $-(CH_2)_j-N(R_b)$ $-CH_2-(CH_2-O-CH_2)_k-CH_2-CO_2T$; V_4 is a single bond or is selected from the group consisting of -O-, -S-, -Se-, and $-NR_a$; a_4 and b_4 vary from 0 to 5; a, b, d, f, h, i, and j independently vary from 1-10; c, e, g, and k independently vary from 1-100; R_a, R_b, R_c, and R_d are defined in the same manner as Y_4; and T is either H or a negative charge.

5. The composition as in claims 1, 2, 3, or 4 further comprising a contrast agent.

6. The composition as in claims 1, 2, 3, or 4 wherein the compound comprises a radioactive halogen.

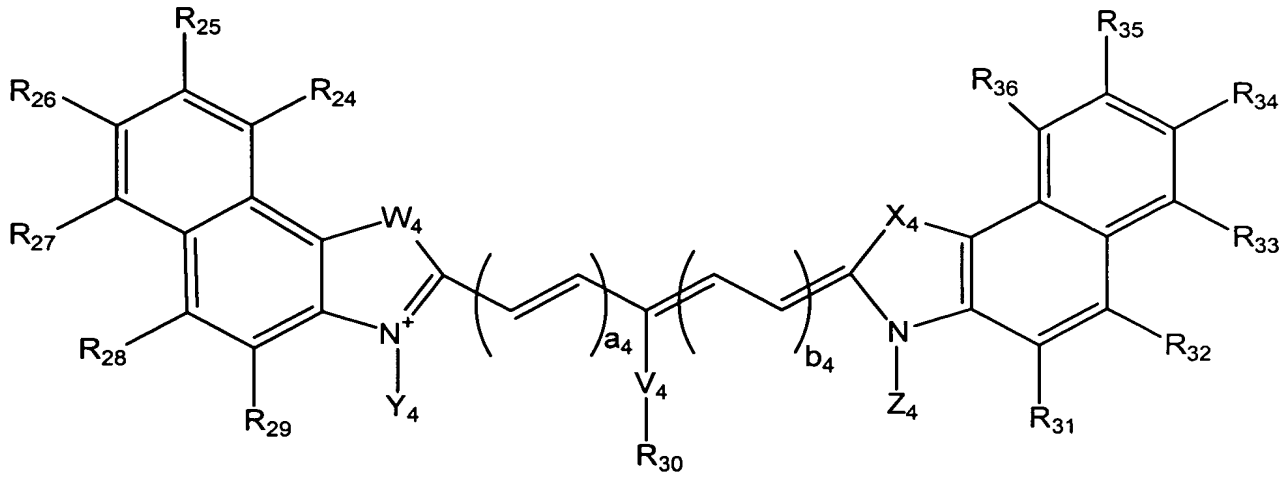
7. The composition as in claims 1, 2, 3, or 4 wherein at least one R group of the compound is replaced by a polyamino carboxylic acid or its derivative.

8. The composition of claim 7 further comprising a radioactive metal ion or a paramagnetic metal ion.

9. The composition as in claims 1, 2, 3, 4, 6, or 7 formulated as at least one of a liposome, a micell, a microcapsule, or a microparticle.

10. The composition as in claims 1, 2, 3, 4, 6, or 7 formulated as at least one of ultra small iron oxide particles, silver particles, or gold particles.

11. A method for performing a diagnostic or therapeutic procedure comprising administering to a mammal an effective amount of the compound of formula 4

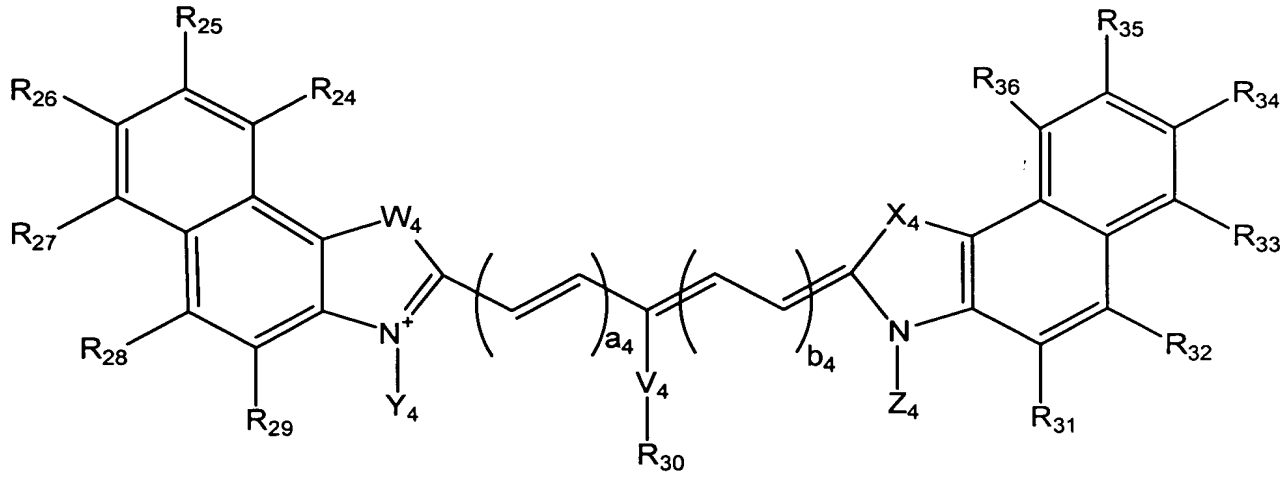


Formula 4

wherein at least one of W_4 and X_4 is $-CR_cR_d$ and the other is selected from the group consisting of $-CR_cR_d$, $-NR_c$, -O-, and -S-; R_{24}, R_{25}, R_{26}, R_{27}, R_{28}, R_{29}, R_{30}, R_{31}, R_{32}, R_{33}, R_{34}, R_{35} and R_{36}, Y_4, and Z_4 are independently selected from the group consisting of C1-C10 alkoxyl, C1-C10 polyalkoxyalkyl, C1-C20 polyhydroxyalkyl, C5-C20 polyhydroxyaryl, glucose derivatives of R groups, saccharides, amino, C1-C10 aminoalkyl, cyano, nitro, halogen, hydrophilic peptides, arylpolysulfonates, C1-C10 alkyl, C5-C20 aryl, $-SO_3T$, $-CO_2T$, -OH, $-(CH_2)_aSO_3T$, $-(CH_2)_aOSO_3T$, $-(CH_2)_aNHSO_3T$, $-(CH_2)_aCO_2(CH_2)_bSO_3T$, $-(CH_2)_aOCO(CH_2)_bSO_3T$, $-(CH_2)_aCONH(CH_2)_bSO_3T$, $-(CH_2)_aNHCO(CH_2)_bSO_3T$, $-(CH_2)_aNHCONH(CH_2)_bSO_3T$, $-(CH_2)_aNHCSNH(CH_2)_bSO_3T$, $-(CH_2)_aOCONH(CH_2)_bSO_3T$, $-(CH_2)_aPO_3HT$, $-(CH_2)_aPO_3T_2$, $-(CH_2)_aOPO_3HT$, $-(CH_2)_aOPO_3T_2$, $-(CH_2)_aNHPO_3HT$, $-(CH_2)_aNHPO_3T_2$, $-(CH_2)_aCO_2(CH_2)_bPO_3HT$, $-(CH_2)_aCO_2(CH_2)_bPO_3T_2$, $-(CH_2)_aOCO(CH_2)_bPO_3HT$, $-(CH_2)_aOCO(CH_2)_bPO_3T_2$, $-(CH_2)_aCONH(CH_2)_bPO_3HT$, $-(CH_2)_aCONH(CH_2)_bPO_3T_2$,

$-(CH_2)_aNHCO(CH_2)_bPO_3HT$, $-(CH_2)_aNHCO(CH_2)_bPO_3T_2$, $-(CH_2)_aNHCONH(CH_2)_bPO_3HT$, $-(CH_2)_aNHCONH(CH_2)_bPO_3T_2$, $-CH_2)_aNHCSNH(CH_2)_bPO_3HT$, $-(CH_2)_aNHCSNH(CH_2)_bPO_3T_2$, $-(CH_2)_aOCONH(CH_2)_bPO_3HT$, and $-(CH_2)_aOCONH(CH_2)_bPO_3T_2$, $-CH_2(CH_2-O-CH_2)_c-CH_2-OH$, $-(CH_2)_d-CO_2T$, $-CH_2-(CH_2-O-CH_2)_e-CH_2-CO_2T$, $-(CH_2)_f-NH_2$, $-CH_2-(CH_2-O-CH_2)_g-CH_2-NH_2$, $-(CH_2)_h-N(R_a)-(CH_2)_i-CO_2T$, and $-(CH_2)_j-N(R_b)-CH_2-(CH_2-O-CH_2)_k-CH_2-CO_2T$; V_4 is a single bond or is selected from the group consisting of -O-, -S-, -Se-, and $-NR_a$; a_4 and b_4 vary from 0 to 5; a, b, d, f, h, i, and j independently vary from 1-10; c, e, g, and k independently vary from 1-100; R_a, R_b, R_c, and R_d are defined in the same manner as Y_4; and T is either H or a negative charge, and thereafter performing the diagnostic or therapeutic procedure.

12. A method for performing a diagnostic or therapeutic procedure comprising administering to a mammal an effective amount of the compound of formula 4

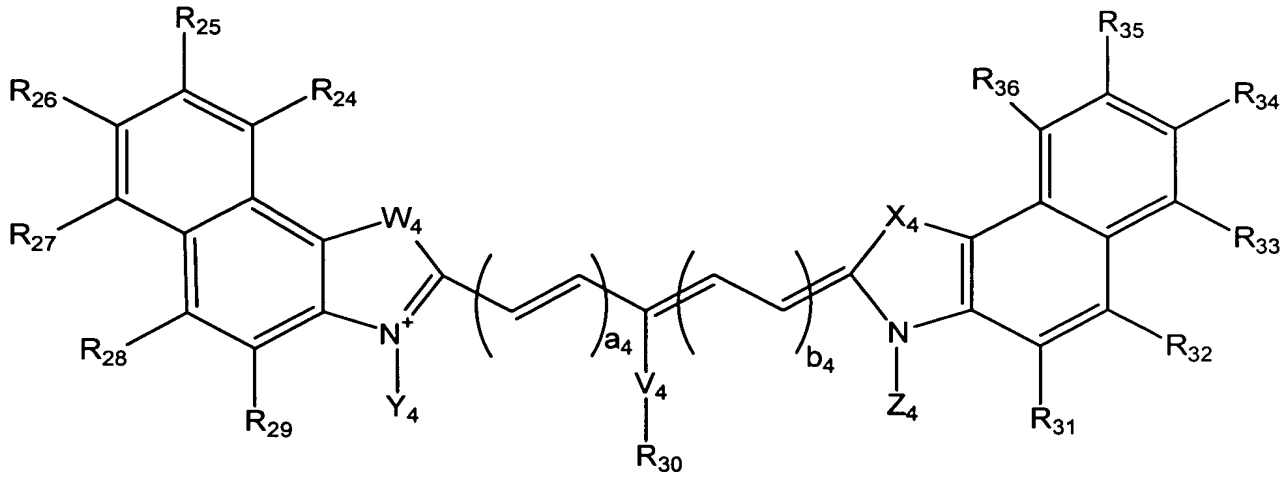


Formula 4

wherein at least one of W_4 and X_4 is O and the other is selected from the group consisting of $-CR_cR_d$, $-NR_c$, -O-, and -S-; R_{24}, R_{25}, R_{26}, R_{27}, R_{28}, R_{29}, R_{30}, R_{31}, R_{32}, R_{33}, R_{34}, R_{35} and R_{36}, Y_4, and Z_4 are independently selected from the group consisting of C1-C10 alkoxyl, C1-C10 polyalkoxyalkyl, C1-C20 polyhydroxyalkyl, C5-C20 polyhydroxyaryl, glucose derivatives of R groups, saccharides, amino, C1-C10 aminoalkyl, cyano, nitro, halogen, hydrophilic peptides, arylpolysulfonates, C1-C10 alkyl, C5-C20 aryl, $-SO_3T$, $-CO_2T$, -OH, $-(CH_2)_aSO_3T$, $-(CH_2)_aOSO_3T$, $-(CH_2)_aNHSO_3T$, $-(CH_2)_aCO_2(CH_2)_bSO_3T$, $-(CH_2)_aOCO(CH_2)_bSO_3T$, $-(CH_2)_aCONH(CH_2)_bSO_3T$, $-(CH_2)_aNHCO(CH_2)_bSO_3T$, $-(CH_2)_aNHCONH(CH_2)_bSO_3T$, $-(CH_2)_aNHCSNH(CH_2)_bSO_3T$, $-(CH_2)_aOCONH(CH_2)_bSO_3T$, $-(CH_2)_aPO_3HT$, $-(CH_2)_aPO_3T_2$, $-(CH_2)_aOPO_3HT$, $-(CH_2)_aOPO_3T_2$, $-(CH_2)_aNHPO_3HT$, $-(CH_2)_aNHPO_3T_2$, $-(CH_2)_aCO_2(CH_2)_bPO_3HT$, $-(CH_2)_aCO_2(CH_2)_bPO_3T_2$, $-(CH_2)_aOCO(CH_2)_bPO_3HT$, $-(CH_2)_aOCO(CH_2)_bPO_3T_2$, $-(CH_2)_aCONH(CH_2)_bPO_3HT$, $-(CH_2)_aCONH(CH_2)_bPO_3T_2$,

$-(CH_2)_aNHCO(CH_2)_bPO_3HT$, $-(CH_2)_aNHCO(CH_2)_bPO_3T_2$, $-(CH_2)_aNHCONH(CH_2)_bPO_3HT$, $-(CH_2)_aNHCONH(CH_2)_bPO_3T_2$, $-(CH_2)_aNHCSNH(CH_2)_bPO_3HT$, $-(CH_2)_aNHCSNH(CH_2)_bPO_3T_2$, $-(CH_2)_aOCONH(CH_2)_bPO_3HT$, and $-(CH_2)_aOCONH(CH_2)_bPO_3T_2$, $-CH_2(CH_2-O-CH_2)_c-CH_2-OH$, $-(CH_2)_d-CO_2T$, $-CH_2-(CH_2-O-CH_2)_e-CH_2-CO_2T$, $-(CH_2)_f-NH_2$, $-CH_2-(CH_2-O-CH_2)_g-CH_2-NH_2$, $-(CH_2)_h-N(R_a)-(CH_2)_l-CO_2T$, and $-(CH_2)_j-N(R_b)-CH_2-(CH_2-O-CH_2)_k-CH_2-CO_2T$; V_4 is a single bond or is selected from the group consisting of -O-, -S-, -Se-, and $-NR_a$; a_4 and b_4 vary from 0 to 5; a, b, d, f, h, i, and j independently vary from 1-10; c, e, g, and k independently vary from 1-100; R_a, R_b, R_c, and R_d are defined in the same manner as Y_4; and T is either H or a negative charge, and thereafter performing the diagnostic or therapeutic procedure.

13. A method for performing a diagnostic or therapeutic procedure comprising administering to a mammal an effective amount of the compound of formula 4

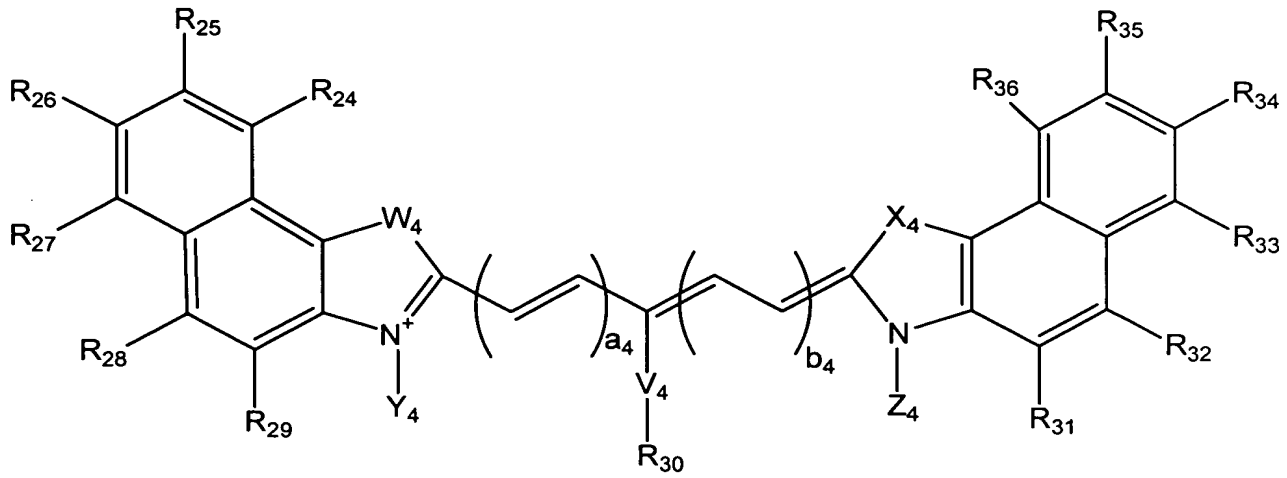


Formula 4

wherein at least one of W_4 and X_4 is NR_c and the other is selected from the group consisting of $-CR_cR_d$, $-NR_c$, -O-, and -S-; R_{24}, R_{25}, R_{26}, R_{27}, R_{28}, R_{29}, R_{30}, R_{31}, R_{32}, R_{33}, R_{34}, R_{35} and R_{36}, Y_4, and Z_4 are independently selected from the group consisting of C1-C10 alkoxyl, C1-C10 polyalkoxyalkyl, C1-C20 polyhydroxyalkyl, C5-C20 polyhydroxyaryl, glucose derivatives of R groups, saccharides, amino, C1-C10 aminoalkyl, cyano, nitro, halogen, hydrophilic peptides, arylpolysulfonates, C1-C10 alkyl, C5-C20 aryl, $-SO_3T$, $-CO_2T$, -OH, $-(CH_2)_aSO_3T$, $-(CH_2)_aOSO_3T$, $-(CH_2)_aNHSO_3T$, $-(CH_2)_aCO_2(CH_2)_bSO_3T$, $-(CH_2)_aOCO(CH_2)_bSO_3T$, $-(CH_2)_aCONH(CH_2)_bSO_3T$, $-(CH_2)_aNHCO(CH_2)_bSO_3T$, $-(CH_2)_aNHCONH(CH_2)_bSO_3T$, $-(CH_2)_aNHCSNH(CH_2)_bSO_3T$, $-(CH_2)_aOCONH(CH_2)_bSO_3T$, $-(CH_2)_aPO_3HT$, $-(CH_2)_aPO_3T_2$, $-(CH_2)_aOPO_3HT$, $-(CH_2)_aOPO_3T_2$, $-(CH_2)_aNHPO_3HT$, $-(CH_2)_aNHPO_3T_2$, $-(CH_2)_aCO_2(CH_2)_bPO_3HT$, $-(CH_2)_aCO_2(CH_2)_bPO_3T_2$, $-(CH_2)_aOCO(CH_2)_bPO_3HT$, $-(CH_2)_aOCO(CH_2)_bPO_3T_2$, $-(CH_2)_aCONH(CH_2)_bPO_3HT$, $-(CH_2)_aCONH(CH_2)_bPO_3T_2$,

$-(CH_2)_aNHCO(CH_2)_bPO_3HT$, $-(CH_2)_aNHCO(CH_2)_bPO_3T_2$, $-(CH_2)_aNHCONH(CH_2)_bPO_3HT$, $-(CH_2)_aNHCONH(CH_2)_bPO_3T_2$, $-(CH_2)_aNHCSNH(CH_2)_bPO_3HT$, $-(CH_2)_aNHCSNH(CH_2)_bPO_3T_2$, $-(CH_2)_aOCONH(CH_2)_bPO_3HT$, and $-(CH_2)_aOCONH(CH_2)_bPO_3T_2$, $-CH_2(CH_2\text{-}O\text{-}CH_2)_c\text{-}CH_2\text{-}OH$, $-(CH_2)_d\text{-}CO_2T$, $-CH_2\text{-}(CH_2\text{-}O\text{-}CH_2)_e\text{-}CH_2\text{-}CO_2T$, $-(CH_2)_f\text{-}NH_2$, $-CH_2\text{-}(CH_2\text{-}O\text{-}CH_2)_g\text{-}CH_2\text{-}NH_2$, $-(CH_2)_h\text{-}N(R_a)\text{-}(CH_2)_i\text{-}CO_2T$, and $-(CH_2)_j\text{-}N(R_b)\text{-}CH_2\text{-}(CH_2\text{-}O\text{-}CH_2)_k\text{-}CH_2\text{-}CO_2T$; V_4 is a single bond or is selected from the group consisting of -O-, -S-, -Se-, and $-NR_a$; a_4 and b_4 vary from 0 to 5; a, b, d, f, h, i, and j independently vary from 1-10; c, e, g, and k independently vary from 1-100; R_a, R_b, R_c, and R_d are defined in the same manner as Y_4; and T is either H or a negative charge, and thereafter performing the diagnostic or therapeutic procedure.

14. A method for performing a diagnostic or therapeutic procedure comprising administering to a mammal an effective amount of the compound of formula 4



Formula 4

wherein at least one of W_4 and X_4 is S and the other is selected from the group consisting of $-CR_cR_d$, $-NR_c$, -O-, and -S-; R_{24}, R_{25}, R_{26}, R_{27}, R_{28}, R_{29}, R_{30}, R_{31}, R_{32}, R_{33}, R_{34}, R_{35} and R_{36}, Y_4, and Z_4 are independently selected from the group consisting of C1-C10 alkoxyl, C1-C10 polyalkoxyalkyl, C1-C20 polyhydroxyalkyl, C5-C20 polyhydroxyaryl, glucose derivatives of R groups, saccharides, amino, C1-C10 aminoalkyl, cyano, nitro, halogen, hydrophilic peptides, arylpolysulfonates, C1-C10 alkyl, C5-C20 aryl, $-SO_3T$, $-CO_2T$, -OH, $-(CH_2)_aSO_3T$, $-(CH_2)_aOSO_3T$, $-(CH_2)_aNHSO_3T$, $-(CH_2)_aCO_2(CH_2)_bSO_3T$, $-(CH_2)_aOCO(CH_2)_bSO_3T$, $-(CH_2)_aCONH(CH_2)_bSO_3T$, $-(CH_2)_aNHCO(CH_2)_bSO_3T$, $-(CH_2)_aNHCONH(CH_2)_bSO_3T$, $-(CH_2)_aNHCSNH(CH_2)_bSO_3T$, $-(CH_2)_aOCONH(CH_2)_bSO_3T$, $-(CH_2)_aPO_3HT$, $-(CH_2)_aPO_3T_2$, $-(CH_2)_aOPO_3HT$, $-(CH_2)_aOPO_3T_2$, $-(CH_2)_aNHPO_3HT$, $-(CH_2)_aNHPO_3T_2$, $-(CH_2)_aCO_2(CH_2)_bPO_3HT$, $-(CH_2)_aCO_2(CH_2)_bPO_3T_2$, $-(CH_2)_aOCO(CH_2)_bPO_3HT$, $-(CH_2)_aOCO(CH_2)_bPO_3T_2$, $-(CH_2)_aCONH(CH_2)_bPO_3HT$, $-(CH_2)_aCONH(CH_2)_bPO_3T_2$,

$-(CH_2)_aNHCO(CH_2)_bPO_3HT$, $-(CH_2)_aNHCO(CH_2)_bPO_3T_2$, $-(CH_2)_aNHCONH(CH_2)_bPO_3HT$, $-(CH_2)_aNHCONH(CH_2)_bPO_3T_2$, $-(CH_2)_aNHCSNH(CH_2)_bPO_3HT$, $-(CH_2)_aNHCSNH(CH_2)_bPO_3T_2$, $-(CH_2)_aOCONH(CH_2)_bPO_3HT$, and $-(CH_2)_aOCONH(CH_2)_bPO_3T_2$, $-CH_2(CH_2\text{-}O\text{-}CH_2)_c\text{-}CH_2\text{-}OH$, $-(CH_2)_d\text{-}CO_2T$, $-CH_2\text{-}(CH_2\text{-}O\text{-}CH_2)_e\text{-}CH_2\text{-}CO_2T$, $-(CH_2)_f\text{-}NH_2$, $-CH_2\text{-}(CH_2\text{-}O\text{-}CH_2)_g\text{-}CH_2\text{-}NH_2$, $-(CH_2)_h\text{-}N(R_a)\text{-}(CH_2)_i\text{-}CO_2T$, and $-(CH_2)_j\text{-}N(R_b)\text{-}CH_2\text{-}(CH_2\text{-}O\text{-}CH_2)_k\text{-}CH_2\text{-}CO_2T$; V_4 is a single bond or is selected from the group consisting of -O-, -S-, -Se-, and $-NR_a$; a_4 and b_4 vary from 0 to 5; a, b, d, f, h, i, and j independently vary from 1-10; c, e, g, and k independently vary from 1-100; R_a, R_b, R_c, and R_d are defined in the same manner as Y_4; and T is either H or a negative charge, and thereafter performing the diagnostic or therapeutic procedure.

15. The method as in claims 11, 12, 13, or 14 wherein said procedure utilizes light of wavelength in the region of 350-1300nm.

16. The method of claim 15 wherein said procedure comprises monitoring a blood clearance profile by fluorescence using light of wavelength in the region of 350 nm to 1300 nm.

17. The method as in claims 11, 12, 13, or 14 wherein said procedure comprises monitoring a blood clearance profile by absorption using light of wavelength in the region of 350 nm to 1300 nm.

18. The method as in claims 11, 12, 13, or 14 wherein the compound contains a radioactive halogen and imaging the mammal by at least one of optical imaging and nuclear imaging.

19. The method as in claims 11, 12, 13, or 14 where the compound administered has at least one R group replaced by a polyamino carboxylic acid or its derivative.

20. The method as in claims 11, 12, 13, or 14 wherein the compound administered further comprises a radioactive metal ion or a paramagnetic metal ion.

21. The method as in claims 11, 12, 13, 14, 19, or 20 further comprising imaging by at least one of optical imaging, nuclear imaging, or magnetic resonance imaging.

22. The method as in claims 11, 12, 13, 14, or 19 wherein the compound is administered in a formulation selected from at least one of liposomes, micelles, microcapsules, or microparticles.

23. The method as in claims 11, 12, 13, 14, 18, 19, or 20 wherein the compound is administered in a formulation selected from at least one of ultra small iron oxide particles, silver particles, or gold particles.

24. The method as in claims 11, 12, 13, 14, 18, 19, 20, 21, 22, or 23 further comprising administering a non-optical contrast agent and imaging by at least one of magnetic resonance, ultrasound, x-ray, positron emission tomography, computed tomography, optoacoustic imaging, and single photon emission computed tomography.

25. The method as in claims 11, 12, 13, 14, 18, 19, 20, 21, 22, or 23 wherein said procedure is for physiological function monitoring.

26. The method as in claims 11, 12, 13, 14, 18, 19, 20, 21, 22, or 23 wherein said procedure is for at least one of renal function monitoring, cardiac function monitoring, and kidney function monitoring.

27. The method as in claims 11, 12, 13, 14, 18, 19, 20, 21, 22, or 23 wherein said procedure is for determining organ perfusion *in vivo.*

28. The method as in claims 11, 12, 13, 14, 18, 19, 20, 21, 22, or 23 further comprising optically imaging the mammal.

29. The method of imaging a patient comprising administering a non-optical contrast agent composition further comprising the compound as in claims 1, 2, 3, 4, 7, or 8 and performing at least one of an optical imaging procedure or a non-optical imaging procedure.

30. The method of claim 29 wherein the non-optical contrast agent composition is chosen from a magnetic resonance composition, a computed tomography composition, an x-ray composition, a nuclear imaging composition, a positron emission tomography composition, a single photon emission computed tomography composition, an optoacoustic imaging composition and an ultrasound composition.

31. The method of claim 29 wherein the compound stabilizes or buffers the non-optical contrast agent composition.